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Job No.: SCE/BBMP/RL/17/2020-2021

04.03.2021

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	: **Executive Engineer,** RR Naga Division,BBMP, Bangalore.
Agency	: **Sri. R Lokesh,** Contractor, Bangalore.
Name of Work	Compreshensive development of roads and drains in Muthyalanagara, LC-4A, Mohankumarnagara, Sundar nagara and surrounding areas in ward no-17 under PACKAGE-2019-20 RRN-DIV-(09)
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Bituminous Concrete
Date of Testing	04.03.2021

Sl no	Test	1	2	3	Requirements as per MORTH 5th edition table no 500.16
1	Flakiness Index	12.3	10.8	12.1	Combined Flakiness & Elongation index Max 35%
2	Elongation Index	10.7	12.6	13.6	
	Combined Flakiness & Elongation index	23.00	23.40	25.70	

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Job No.: SCE/BBMP/RL/17/2020-2021

Specific Gravity And Water Absorption Test

06.03.2021

Client	: Executive Engineer, RR Naga Division,BBMP, Bangalore.
Agency	: Sri. R Lokesh, Contractor, Bangalore.
Name of the Work	Compreshensive development of roads and drains in Muthyalanagara, LC-4A, Mohankumarnagara, Sundar nagara and surrounding areas in ward no-17 under
BIS Code	:IS 2386(Part 3):1963
Type of Mix	Bituminous Concrete
Date of Testing	04.03.2021 to 06.03.2021

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2020	2021	2023	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1265	1266	1268	
4	Weight of saturated surface dry aggregate in air	W_3 g	2015	2015	2019	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	750	749	751	
6	Weight of oven dried aggregate	W_4 g	2006	2007	2008	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.675	2.680	2.674	2.676
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.707	2.709	2.714	2.710
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.45%	0.40%	0.55%	0.47%

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Concrete is 2.0%(MORTH table 500.16)

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Job No.: SCE/BBMP/RL/17/2020-2021

Specific Gravity And Water Absorption Test

06.03.2021

Client	: Executive Engineer, RR Naga Division,BBMP, Bangalore.
Agency	: Sri. R Lokesh, Contractor, Bangalore.
Name of the Work	Compreshensive development of roads and drains in Muthyalanagara, LC-4A, Mohankumarnagara, Sundar nagara and surrounding areas in ward no-17 under
BIS Code	:IS 2386(Part 3):1963
Type of Mix	Bituminous Concrete
Date of Testing	04.03.2021 to 06.03.2021

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2022	2020	2021	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1267	1265	1266	
4	Weight of saturated surface dry aggregate in air	W_3 g	2016	2018	2018	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	749	753	752	
6	Weight of oven dried aggregate	W_4 g	2006	2007	2008	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.678	2.665	2.670	2.671
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.714	2.705	2.706	2.709
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.50%	0.55%	0.50%	0.51%

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Concrete is 2.0%(MORTH table 500.16)

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Job No.: SCE/BBMP/RL/17/2020-2021

12.03.2021

BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE

AASHTO T 164 & AASHTO T 30

CLIENT	: Executive Engineer, RR Naga Division,BBMP, Bangalore.
AGENCY	: Sri. R Lokesh, Contractor, Bangalore.
NAME OF THE WORK	Compreshensive development of roads and drains in Muthyalanagara, LC-4A, Mohankumarnagara, Sundar nagara and surrounding areas in ward no-17 under PACKAGE-2019-20 RRN-DIV-(09)
SAMPLE ID	:Hot Mix Plant, Bangalore
DATE OF TESTING	12.03.2021

BITUMEN CONTENT DETERMINATION

Description	Sample 1	Sample 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	472.9	472.7
3. Weight of Asphalt and Mineral matter Extracted, g	27.1	27.3
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g	-	-
6. Weight of Bitumen Extracted, g. (corrected)	27.1	27.3
7. Bitumen content in %	5.42	5.46
8. Average	5.44	

GRADATION AFTER EXTRACTION

SIEVE SIZE mm	Test 1 Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	Requirement as per MORTH table 500.17
19	0	0	0	100	100
13.2	12.8	12.8	2.7	97.3	90 - 100
9.5	66.6	79.4	16.8	83.2	70 - 88
4.75	95.5	174.9	37.0	63.0	53 - 71
2.36	45.5	220.4	46.6	53.4	42 - 58
1.18	43.3	263.7	55.8	44.2	34 - 48
0.600	52.2	315.9	66.8	33.2	26 - 38
0.300	45.5	361.4	76.4	23.6	18 - 28
0.150	33.6	395	83.5	16.5	12 - 20
0.075	48.8	443.8	93.8	6.2	4 - 10

SIEVE SIZE mm	Test 2 Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	Requirement as per MORTH table 500.17
19	0	0	0	100	100
13.2	12.1	12.1	2.6	97.4	90 - 100
9.5	66.5	78.6	16.6	83.4	70 - 88
4.75	89.6	168.2	35.6	64.4	53 - 71
2.36	48.2	216.4	45.8	54.2	42 - 58
1.18	43.1	259.5	54.9	45.1	34 - 48
0.600	52.7	312.2	66.0	34.0	26 - 38
0.300	42.1	354.3	75.0	25.0	18 - 28
0.150	33.8	388.1	82.1	17.9	12 - 20
0.075	48.3	436.4	92.3	7.7	4 - 10

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13.03.2021

BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE

AASHTO T 164 & AASHTO T 30

CLIENT	: Executive Engineer, RR Naga Division,BBMP, Bangalore.
AGENCY	: Sri. R Lokesh, Contractor, Bangalore.
NAME OF THE WORK	Compreshensive development of roads and drains in Muthyalanagara, LC-4A, Mohankumarnagara, Sundar nagara and surrounding areas in ward no-17 under PACKAGE-2019-20 RRN-DIV-(09)
SAMPLE ID	:Hot Mix Plant, Bangalore
DATE OF TESTING	13.03.2021

BITUMEN CONTENT DETERMINATION

Description	Sample 1	Sample 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	472.7	472.3
3. Weight of Asphalt and Mineral matter Extracted, g	27.3	27.7
4: Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g	-	-
6. Weight of Bitumen Extracted, g. (corrected)	27.3	27.7
7. Bitumen content in %	5.46	5.54
8. Average	5.50	

GRADATION AFTER EXTRACTION

SIEVE SIZE mm	Test 1				Requirement as per MORTH table 500.17
	Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	13.1	13.1	2.8	97.2	90 - 100
9.5	66.9	80	16.9	83.1	70 - 88
4.75	95.1	175.1	37.0	63.0	53 - 71
2.36	48.8	223.9	47.4	52.6	42 - 58
1.18	43.3	267.2	56.5	43.5	34 - 48
0.600	52.2	319.4	67.6	32.4	26 - 38
0.300	42.2	361.6	76.5	23.5	18 - 28
0.150	33.6	395.2	83.6	16.4	12 - 20
0.075	48.8	444	93.9	6.1	4 - 10

SIEVE SIZE mm	Test 2				Requirement as per MORTH table 500.17
	Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	10.8	10.8	2.3	97.7	90 - 100
9.5	66.9	77.7	16.5	83.5	70 - 88
4.75	95.5	173.2	36.7	63.3	53 - 71
2.36	45.5	218.7	46.3	53.7	42 - 58
1.18	43.3	262	55.5	44.5	34 - 48
0.600	52.2	314.2	66.5	33.5	26 - 38
0.300	41.5	355.7	75.3	24.7	18 - 28
0.150	36.6	392.3	83.1	16.9	12 - 20
0.075	48.8	441.1	93.4	6.6	4 - 10

Asst. Executive Engineer
Yeshwanthpura Sub Division
BBMP

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Job No.: SCE/BBMP/RL/17/2020-2021

15.03.2021

BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE

AASHTO T 164 & AASHTO T 30

CLIENT	: Executive Engineer, RR Naga Division,BBMP, Bangalore.
AGENCY	: Sri. R Lokesh, Contractor, Bangalore.
NAME OF THE WORK	Compreshensive development of roads and drains in Muthyalanagara, LC-4A, Mohankumarnagara, Sundar nagara and surrounding areas in ward no-17 under PACKAGE-2019-20 RRN-DIV-(09)
SAMPLE ID	:Hot Mix Plant, Bangalore
DATE OF TESTING	15.03.2021

BITUMEN CONTENT DETERMINATION

Description	Sample 1	Sample 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	473	472.5
3. Weight of Asphalt and Mineral matter Extracted, g	27	27.5
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g	-	-
6. Weight of Bitumen Extracted, g. (corrected)	27	27.5
7. Bitumen content in %	5.40	5.50
8. Average	5.45	

GRADATION AFTER EXTRACTION

SIEVE SIZE mm	Test 1 Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	Requirement as per MORTH table 500.17
19	0	0	0	100	100
13.2	13.9	13.9	2.9	97.1	90 - 100
9.5	62.2	76.1	16.1	83.9	70 - 88
4.75	96.6	172.7	36.5	63.5	53 - 71
2.36	48.8	221.5	46.8	53.2	42 - 58
1.18	43.3	264.8	56.0	44.0	34 - 48
0.600	52.2	317	67.0	33.0	26 - 38
0.300	45.5	362.5	76.6	23.4	18 - 28
0.150	33.6	396.1	83.7	16.3	12 - 20
0.075	48.8	444.9	94.1	5.9	4 - 10

SIEVE SIZE mm	Test 2 Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	Requirement as per MORTH table 500.17
19	0	0	0	100	100
13.2	10.7	10.7	2.3	97.7	90 - 100
9.5	66.6	77.3	16.4	83.6	70 - 88
4.75	95.5	172.8	36.6	63.4	53 - 71
2.36	45.5	218.3	46.2	53.8	42 - 58
1.18	43.3	261.6	55.4	44.6	34 - 48
0.600	52.2	313.8	66.4	33.6	26 - 38
0.300	42.2	356	75.3	24.7	18 - 28
0.150	36.6	392.6	83.1	16.9	12 - 20
0.075	50.2	442.8	93.7	6.3	4 - 10

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Job No.: SCE/BBMP/RL/17/2020-2021

16.03.2021

BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE

AASHTO T 164 & AASHTO T 30

CLIENT	: Executive Engineer, RR Naga Division,BBMP, Bangalore.
AGENCY	: Sri. R Lokesh, Contractor, Bangalore.
NAME OF THE WORK	Compreshensive development of roads and drains in Muthyalanagara, LC-4A, Mohankumarnagara, Sundar nagara and surrounding areas in ward no-17 under PACKAGE-2019-20 RRN-DIV-(09)
SAMPLE ID	:Hot Mix Plant, Bangalore
DATE OF TESTING	16.03.2021

BITUMEN CONTENT DETERMINATION

Description	Sample 1	Sample 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	472.8	472.7
3. Weight of Asphalt and Mineral matter Extracted, g	27.2	27.3
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g	-	-
6. Weight of Bitumen Extracted, g. (corrected)	27.2	27.3
7. Bitumen content in %	5.44	5.46
8. Average	5.45	

GRADATION AFTER EXTRACTION

SIEVE SIZE mm	Test 1				Requirement as per MORTH table 500.17
	Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	12.7	12.7	2.7	97.3	90 - 100
9.5	64.5	77.2	16.3	83.7	70 - 88
4.75	96.6	173.8	36.8	63.2	53 - 71
2.36	50.2	224	47.4	52.6	42 - 58
1.18	41.1	265.1	56.1	43.9	34 - 48
0.600	50.9	316	66.8	33.2	26 - 38
0.300	42.2	358.2	75.8	24.2	18 - 28
0.150	33.3	391.5	82.8	17.2	12 - 20
0.075	48.5	440	93.1	6.9	4 - 10

SIEVE SIZE mm	Test 2				Requirement as per MORTH table 500.17
	Weight Retained, gm	Cummulative Weight Retained	%Cummulative Retained	% Passing	
19	0	0	0	100	100
13.2	13.8	13.8	2.9	97.1	90 - 100
9.5	66	79.8	16.9	83.1	70 - 88
4.75	95.5	175.3	37.1	62.9	53 - 71
2.36	45.5	220.8	46.7	53.3	42 - 58
1.18	43.3	264.1	55.9	44.1	34 - 48
0.600	52.2	316.3	66.9	33.1	26 - 38
0.300	41.1	357.4	75.6	24.4	18 - 28
0.150	33.3	390.7	82.7	17.3	12 - 20
0.075	50.2	440.9	93.3	6.7	4 - 10

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Job No.: SCE/BBMP/RL/17/2020-2021 Date: 12.03.2021

TEST REPORT ON STABILITY OF MIX

Client	:	**: Executive Engineer,** RR Naga Division,BBMP, Bangalore.
Agency	:	**: Sri. R Lokesh,** Contractor, Bangalore.
Name of the Work	:	Compreshensive development of roads and drains in Muthyalanagara, LC-4A, Mohankumarnagara, Sundar nagara and surrounding areas in ward no-17 under PACKAGE-2019-20 RRN-DIV-(09)
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Bituminous Concrete
Date of Testing	:	12.03.2021

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	9.74	10.12	9 Kn (min)
2	Marshal flow, mm	3.41	2.65	2 – 4
3	Percent air voids in Mineral Aggregate	13.1	14.41	13 – 15
4	Voids in Compacted Mix	3.56	4.32	3 – 6
5	Percent Voids filled with Bitumen	66.52	69.56	65 - 75
6	Density, g/cc	2.27	2.25	--

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Job No.: SCE/BBMP/RL/17/2020-2021 Date: 13.03.2021

TEST REPORT ON STABILITY OF MIX

Client	:	**: Executive Engineer, RR Naga Division,BBMP, Bangalore.**
Agency	:	**: : Sri. R Lokesh, Contractor, Bangalore.**
Name of the Work	:	Compreshensive development of roads and drains in Muthyalanagara, LC-4A, Mohankumarnagara, Sundar nagara and surrounding areas in ward no-17 under PACKAGE-2019-20 RRN-DIV-(09)
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Bituminous Concrete
Date of Testing	:	13.03.2021

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	9.85	10.85	9 Kn (min)
2	Marshal flow, mm	3.63	2.52	2 – 4
3	Percent air voids in Mineral Aggregate	13.89	14.74	13 – 15
4	Voids in Compacted Mix	3.42	4.65	3 – 6
5	Percent Voids filled with Bitumen	66.41	69.32	65 - 75
6	Density, g/cc	2.26	2.27	--

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Job No.: SCE/BBMP/RL/17/2020-2021 Date: 15.03.2021

TEST REPORT ON STABILITY OF MIX

Client	:	**: Executive Engineer, RR Naga Division,BBMP, Bangalore..**
Agency	:	**: : Sri. R Lokesh, Contractor, Bangalore.**
Name of the Work	:	Compreshensive development of roads and drains in Muthyalanagara, LC-4A, Mohankumarnagara, Sundar nagara and surrounding areas in ward no-17 under PACKAGE-2019-20 RRN-DIV-(09)
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Bituminous Concrete
Date of Testing	:	15.03.2021

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	9.21	10.55	9 Kn (min)
2	Marshal flow, mm	3.98	2.96	2 – 4
3	Percent air voids in Mineral Aggregate	13.74	14.32	13 – 15
4	Voids in Compacted Mix	3.21	4.74	3 – 6
5	Percent Voids filled with Bitumen	66.65	69.32	65 - 75
6	Density, g/cc	2.26	2.26	--

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Job No.: SCE/BBMP/RL/17/2020-2021 Date: 16.03.2021

TEST REPORT ON STABILITY OF MIX

Client	:	: : Executive Engineer, RR Naga Division,BBMP, Bangalore.
Agency	:	: : Sri. R Lokesh, Contractor, Bangalore.
Name of the Work	:	Compreshensive development of roads and drains in Muthyalanagara, LC-4A, Mohankumarnagara, Sundar nagara and surrounding areas in ward no-17 under PACKAGE-2019-20 RRN-DIV-(09)
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Bituminous Concrete
Date of Testing	:	16.03.2021

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-19)
1	Marshal Stability, Kn	9.12	10.65	9 Kn (min)
2	Marshal flow, mm	3.65	2.13	2 – 4
3	Percent air voids in Mineral Aggregate	13.75	14.84	13 – 15
4	Voids in Compacted Mix	3.32	4.45	3 – 6
5	Percent Voids filled with Bitumen	66.65	69.72	65 - 75
6	Density, g/cc	2.26	2.27	--

Note:

⇒ This test report shall not be reproduced except in full, without written approval of the laboratory.

⇒ The results indicated above are based on the tests carried out on the samples received in the laboratory.

⇒ Any Query regarding the report must be reported within 30 days from the date of testing.

Asst. Executive Engineer
Yeshwanthpura Sub-Division
Bruhat Bangalore Mahanagara Palike

For SAPIENCE CONSULTANTS

Authorised Signatory

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